BROOKHAVEN BULLETIN
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BROOKHAVEN NATIONAL LABORATORY

$1M Enters U.S. in Compact Synchrotron Race

To begin development of a compact synchrotron and the technology associated with the production of high-speed computer chips by x-ray lithography, the National Synchrotron Light Source (NSLS) last week received $1 million from the Department of Defense (DOD). Congressman George Hochbrueckner, first Congressional district, who worked to secure the funding, announced the allocation on March 19 at a press conference in Washington, D.C.

This is the first outside funding for the initiative undertaken at the NSLS a year ago to enable U.S. supercomputer chip manufacturers to regain their position as world leaders.

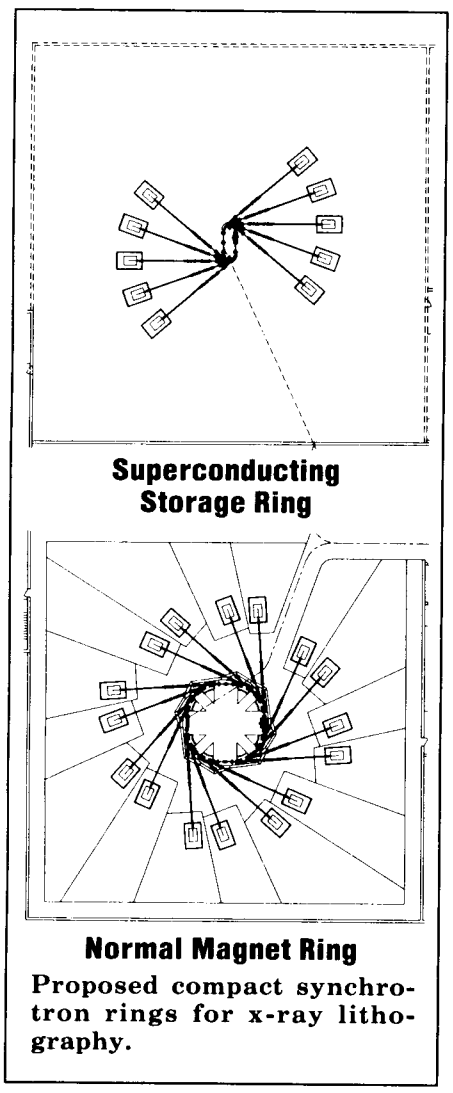
"Brookhaven has unique capabilities to bring to bear on the design of an x-ray source for lithography," says BNL Deputy Director Martin Blume. "We hope to be able to go beyond this study, to build a prototypical synchrotron for x-ray lithography at BNL."

The impetus for the grant, explained Hochbrueckner in announcing the funding, was a recently completed DOD study. It warned that the decreasing competitiveness of U.S. semiconductor manufacturers has forced the military's increased dependence upon foreign chip sources, particularly Japan. The governments of Japan and West Germany are funding the development of compact synchrotrons for producing supercomputer chips by x-ray lithography in their respective countries.

This threatens national security, noted Hochbrueckner, who is a member of the House Armed Services Committee. The report urged DOD to invest further in semiconductor research, development and manufacturing of high speed chips.

As a means of manufacturing smaller and therefore faster computer chips, the semiconductor industry has been experimenting with x-ray lithography. This is a process by which circuit patterns are printed on silicon wafers using soft x-rays, which are produced while electrons circulate in a synchrotron storage ring.

At the vacuum ultraviolet (VUV) ring of the NSLS, for example, IBM conducts x-ray lithography research, with the same goal as the rest of the integrated circuit manufacturers: to develop an economical process of making chips with 0.5-micron or smaller components. By reducing the size of the components on computer chips, computers can operate faster and more efficiently.



Proposed compact synchrotron rings for x-ray lithography.

The fiscal year 1987 seed money from DOD will allow the NSLS to begin designing a more compact synchrotron, using conventional magnets, for chip development. The funding also permits the planning of a facility to house both the conventional ring and a smaller, prototypical ring, which would have superconducting magnets.

"This is an important expansion of the NSLS's role in working with industry," says NSLS Department Chairman Michael Knotek. "Using this $1 million, we will quickly assemble a task force of key people to develop machine designs and facility plans, aiming for an aggressive construction start in fiscal year 1988."

The first storage ring dedicated to producing the specific soft x-rays required for lithographic chip production would be about 30-meters in circumference, a scaled-down version of the 51-meter circumference VUV ring. If funded, this ring and its support facility would serve as the proving ground for instruments used to position x-rays on silicon wafers, as well as the other technology associated with the lithographic process.

A parallel effort would be the research and development of an even smaller, superconducting ring, about 10-meters in circumference. Once the

(Continued on page 2)

News Flash!

A beam of silicon ions, generated in the Tandem Van de Graaff Accelerator facility, was accelerated in the Alternating Gradient Synchrotron (AGS) for the first time on Tuesday evening, March 24. The silicon beam — the heaviest ion beam to circulate through the AGS so far — leveled off at the design energy of 14.5 billion electron volts per nucleon.

Part of the continuing upgrade of the AGS's heavy ion capability, the milestone came just before the start of a four-week run of heavy ion physics at the AGS.

During the first heavy ion run last October, experimenters collected data from collisions with oxygen, which has an atomic weight of 16. The upgrade to silicon, with its much higher atomic weight of 28, means that more nucleons will be compressed into a single volume with each collision. This will increase researchers' chances of seeing the new high-density states of matter they seek.

The silicon ions were generated in the Tandem and delivered to the AGS via a transfer line constructed as part of the Tandem/AGS Heavy Ion Project, completed last spring. Future plans call for accelerating ions as heavy as gold (atomic weight 197), using the Booster ring, now under construction.

Mort Rosen

Discussing the agenda for this week's workshop on Low Emittance Beams, organized by the Panel on Beam Dynamics (PBD) of the International Committee for Future Accelerators (ICFA) are: (front, from left) PBD member Christoph Leeman, Continuous Electron Beam Accelerator Facility; PBD member Eberhard Keil, CERN; (rear, from left) PBD member Alex Chao, Central Design Group, Superconducting Super Collider; PBD member Claudio Pellegrini, National Synchrotron Light Source, BNL; and Robert Palmer, Physics, BNL. Palmer and Pellegrini head BNL's Center for Accelerator Physics. (See story on ICFA workshop on page 2.)

New Test Facility Caps BNL's Accelerator Physics Effort

Construction has begun on a unique accelerator test facility in Bldg. 820, as part of the Center for Accelerator Physics (CAP), established last December. Headed by Senior Physicist Robert Palmer, Director's Office, and Claudio Pellegrini, Associate Chairman of the National Synchrotron Light Source (NSLS), CAP coordinates research into new methods of accelerating particles and producing synchrotron radiation, which is being conducted in various Laboratory departments and divisions.

The accelerator test facility will permit physicists to study the physics of particle beams and to develop related technology, unhampered and unhurried by others who usually use such a particle beam or its resulting radiation for their own experiments.

The facility will consist of a high-brightness electron gun, a high-power carbon dioxide (CO_2) laser, a ten-foot-long linear accelerator (linac) and a 100-foot-long beam line. Some of the components for the linac came from the Stanford Linear Accelerator Center (SLAC), and the CO_2 laser is being built at Los Alamos National Laboratory. The electron gun and beam line are being constructed at BNL.

When the facility is complete, BNL physicists and collaborators from other national laboratories and universities will use it to build and study laser accelerators and picosecond pulse, soft x-ray sources. Depending upon construction funding, the facility should be ready for use by the end of 1989.

Palmer and Pellegrini bring valuable experience and expertise to CAP. Palmer invented the inverse free electron laser in 1972, in 1980 devised the grating laser accelerator and from 1983 to 1986 served as the Lab's Associate Director of High Energy Physics. Pellegrini has done pioneering work in the development of electron storage rings, discovered the Head Tail effect and other high intensity limitations and is working on free electron lasers.

Palmer points out that almost all BNL departments have some sort of accelerator, and that accelerator physicists are scattered throughout the Alternating Gradient Synchrotron (AGS), Accelerator Development (ADD), NSLS and Physics Departments and the Instrumentation Division. However, explains Pellegrini, "Accelerator physicists never have enough time on existing machines to perform the studies they want to do."

He continues, "As the future of the Lab is tied to the development of new, advanced accelerators and synchrotron radiation sources, the Center and the test facility will allow us to encourage this research."

In designing new devices, limitations to the current methods of accelerating particles and generating synchrotron radiation must be overcome. According to Palmer, the goal in accelerator design is to accelerate particles faster over shorter distances, "so you can increase the energy without proportionately increasing the size and cost of the machine."

The aim in designing synchrotron radiation sources is to produce coherent radiation with high brightness and short, picosecond time pulses, says Pellegrini. Decreasing the diameter and the angular spread of the primary beam is a common objective in designing accelerators to have

(Continued on page 2)

Low-Emittance Electron Beams Discussed at ICFA Workshop

Though accelerator physicists researching free electron lasers and those building the next generation of electron-positron colliders have different aims, they have a common need for special electron beams with which to reach their goals. These charged particle beams would have high currents, be extremely dense and have a characteristic called "low-emittance," which makes them tighter and brighter than other electron beams.

To compare approaches to the development of such beams and to share what they have learned so far, over 80 accelerator physicists from here and abroad met at BNL this week for a workshop on "Low Emittance Electron Beams for Linear Colliders and Free Electron Lasers."

Held in the Brookhaven Center, March 20-25, the workshop was organized by the Panel on Beam Dynamics of the International Committee for Future Accelerators (ICFA). At the National Synchrotron Light Source (NSLS), the local organizing effort was led by Assistant Physicist James Murphy and Executive Secretary Toni Rotondo.

NSLS Associate Department Chairman Claudio Pellegrini, a member of the ICFA panel, explained that workshop attendees concentrated on problems encountered in producing low-emittance electron beams and their antiparticle counterparts, positron beams.

The workshop had two objectives: to survey and analyze the need and demand for intense, low-emittance electron and/or positron beams and to advance the understanding of the processes limiting the generation, transport and acceleration of such beams.

One demand for these beams is in colliding beam accelerators for high energy physics. With an expected energy greater than 50 billion electron volts per beam, the biggest electron-positron collider under construction is LEP, now being built at the European laboratory, CERN. But LEP is 27 kilometers in circumference; for a circular electron-positron collider in the trillion-electron-volt energy range, the circumference would increase by a factor of 100.

That's why, said Pellegrini, "people are starting to look seriously at linear colliders, following the work being done at SLAC [Stanford Linear Accelerator Center]. Studies are being done at CERN and at BNL, especially in connection with the Center for Accelerator Physics [see related story, page 1].

"At this point," continued Pellegrini, "it's not clear whether the high-current, high-density, low-emittance electron beams needed for such a linear accelerator can really be produced. To see what can be done, the workshop will try to bring together all who have been working on this subject, such as the SLAC researchers who have built two low-energy storage rings called damping rings designed to produce beams with certain characteristics. A laser-powered electron gun is another option that has come up recently and on which some good progress has been made at Los Alamos and Stanford."

Others at the workshop are interested in producing the same kind of electron beams for free electron lasers (FEL) that would operate at short wavelengths, below 1,000 angstroms. FELs use electrons that are free from the confines of atoms to produce brighter and/or more intense laser beams than generally available.

Said Pellegrini, whose own research is in this area, "A free electron laser that could operate in the soft x-ray region has been the dream of many people for the last two decades, and it would be an ideal extension of the NSLS, a complement to it. Like normal lasers, its radiation would be coherent and all near the same wavelength. Since it would also have very high brightness, however, such a free electron laser could be used for experiments that would not be possible otherwise. Towards this end, NSLS physicists have been studying the possibility of building a damping ring at the Light Source that could produce a beam with the characteristics necessary for a free electron laser."

BNL's Fabulous Forty

"Whereas despite their contributions, the role of American women in history has been consistently overlooked and undervalued in the body of American history . . .," the U.S. Senate and House of Representatives resolved that March 1987 be designated "Women's History Month." To observe this month, the Bulletin offers a two-part examination of the history of women at the Lab.

Do the names Janice Cutler, Mariette Kuper, Mildred Mooney, Florence Nadler, Angela Scannel and Olga Vario sound familar? If you know your BNL history, they should, for these are the names of six of the 19 women first employed at the Lab.

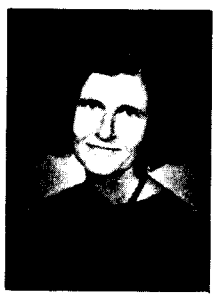
Hired on March 27, 1946, as an executive aide to help establish BNL at Camp Upton, Mariette Kuper, who retired in 1974, was not only the first women to work for BNL, but also the second person to be hired.

"Being a woman didn't matter," says Kuper, who hired support staff and made arrangements for Laboratory visitors. "We all worked so hard getting this Laboratory going, that it didn't make any difference as long as you did what had to be done. I adored my job and had such a marvelous time working at the Lab that I didn't have to be a women's libber."

Mariette Kuper

Gertrude Goldhaber

Louise Hanson



Gail Williams

In June 1950, Gertrude Scharff Goldhaber, Physics, became the first woman with a Ph.D. to become a member of the Lab's scientific staff. "Over the years, I have been very encouraged that more young women are pursuing careers in science, competing successfully with men in their fields and joining the Lab's scientific staff in greater numbers," says Goldhaber, the only BNL woman scientist elected a member of the National Academy of Sciences.

"It is clear that, over the last decade, women have been making their way in good numbers into the Laboratory's middle management in the non-scientific divisions and offices," says Gail Williams, Manager of the Office of Scientific Personnel (OSP) and, since 1980, the Lab's Coordinator of Women's Programs. The latter position was established in 1975 to ensure the development of Laboratory programs to meet the special needs of women.

"With respect to the scientific staff, BNL has done well attracting women to postdoctoral and junior scientific staff positions," continues Williams, "but there is more to be done to increase the representation of women in senior staff positions." To this end, Williams reviews the hiring and retention of women scientists on a case-by-case basis, working with group leaders and department chairmen.

To encourage girls to pursue careers in math, science and engineering, a scientific and professional women's panel was created in 1979 by Harriet Martin, Technical Information Division, and Vicki McLane, Department of Nuclear Energy. Its members spoke to female students, encouraging them to continue their studies in math and science and consider scientific or engineering careers.

From this "One Mind" speakers bureau and career day program, Brookhaven Women in Science (BWIS) that year was born. Supported by OSP, BWIS continues to provide role models for female junior and senior high school students.

Says Louise Hanson, BWIS coordinator, "Although we have focused on concerns of special interest to women, I would like to emphasize that BWIS activities have benefited the entire Laboratory community. We will continue to work towards improving the environment for women working at the Laboratory."

As Lab employees, men and women alike, are no different from the rest of American society, so their perceptions of women and attitudes toward them change with the facts and the fashions of the times. Those changing views of women, as seen through the eyes of the Lab's employee publications, is the subject of next week's Fabulous Forty.

— Marsha Belford

New Facility (Cont'd)

more collisions and radiation sources to have coherent and bright beams.

Accelerator design is usually learned on the job, as there are only a few schools in the country for physics students wishing to study accelerator physics. Therefore, CAP will invite Ph.D. and postdoctoral students to use the accelerator test facility, as well as to do theoretical research under the guidance of its members.

As well, the Center has taken over from the AGS Department the administration of the Fellows in Accelerator Technology program, established in 1983 for physicists new to the accelerator field. CAP also will host the annual Summer School on Particle Accelerators, when it is again held at BNL, possibly in 1988.

A steering committee has been set up to represent the interests of the different departments, as well as accelerator physicists outside the Lab. It is composed of Ernest Courant, ADD; Horst Foelsche, AGS; Samuel Krinsky, NSLS; Peter Thieberger, Physics; Veljko Radeka, Instrumentation; and Andrew Sessler, Lawrence Berkeley Laboratory. As members of the Center retain their departmental affiliation, CAP has a staff of only one: part-time Senior Secretary Kathleen Tuohy.

Those involved with the design and construction of the accelerator test facility include: Ken Batchelor, NSLS; Richard Fernow, Physics; Joachim Fischer, Instrumentation; Hank Hsieh, NSLS; Harold Kirk, Physics; Radeka; Joseph Sheehan Jr., NSLS; Triveni Srinivasan-Rao, Instrumentation; Arie van Steenbergen, NSLS; and Li-Hua Yu, NSLS. — Marsha Belford

Synchrotron (Cont'd)

technology is proven, the small synchrotron would become the prototype for industrially built, factory-sized synchrotrons.

Within the next six months, the NSLS will look into establishing a participating consortium of groups from industry, university and government, and will produce a report outlining the project.

Says Jules Godel, NSLS Associate Chairman for Projects & Planning, who helped devise the plan to obtain this funding, "The NSLS is uniquely suited for the upcoming study and the construction program to follow, and, with our experience, we are more than ready to undertake this project."

The NSLS will also draw upon those groups that participated in three workshops held at BNL during 1986, during which the economic and technical aspects of synchrotron-based, x-ray lithography were discussed. The outcome of the meetings was a proposal to research and develop integrated circuits with 0.25-micron features by x-ray lithography and the associated synchrotron light sources.

"I am very happy to see some funding materialize as soon as it did," says Gwyn Williams, Head of the Workshop Steering Committee, who worked closely with William Marcuse, Head of the Office of Research and Technology Applications, to undertake this effort. "We must move quickly if we are to beat overseas competition and restore U.S. leadership in the supercomputer and semiconductor industries." — Marsha Belford

Radical Research or Dread Disease?

The origin of this photo is unclear, but those who submitted it to the Bulletin speculated that it could have been taken many years ago, to commemorate the semi-successful results of the Jimmy Durante Cloning Clinic, which was phased out when all the clones turned out to look like Groucho Marx. A further possibility is that this is a group of co-workers exhibiting the early stages of the dread disease "Lookalikitis." This affliction, which strikes people who spend eight hours a day together for years on end, can manifest itself physically, as in the similar nose structures and stances, or mentally, as in the obviously uncontrollable urge to dress alike. — !looF lirpA

BERA Clubs From A to V

If you like to or to , to play or , there's a club for you sponsored by the Brookhaven Employees Recreation Association (BERA). In fact, 43 groups catering to a wide variety of interests are included on this listing of current BERA activities. For more information, call the Recreation Office, Ext. 2873.

Activity	Description	Contact Name	Phone
Aerobic Dance Club	Aerobic dance classes held twice a week; stretch class, once a week.	Paula Bennett	3293
Afro-American Culture Club	Meets regularly to promote cultural awareness and encourage inter-cultural exchange.	Bruce Penn	7213
Archery Club	Uses outdoor range year-round; provides free instruction to beginners.	Joseph Bauernfeind	5131
Art Committee	Organizes professional and employees' exhibits.	Clare Sheppard	3946
Astronomy Club	Shares interest in the skies through observation and lectures.	Richard Jackimowicz	3803
Aviation Club	Meets monthly to promote understanding, safety, enjoyment of flying; all are welcome.	Douglas Sweely	4237
Badminton Club	Plays year-round; holds winter tournaments in gym.	William Love	3996
Basketball League	Teams compete once a week in gym, Dec.-Mar.	Gregory Mack	7617
Bowling League	Leagues bowl at local alleys, Sep.-Apr.	Ed Sperry	2677
Camera Club	Meets monthly; uses club's darkroom facilities for black & white and color processing.	Lewis Jacobson	7636
Camping Club	Organizes camp-outs spring through fall, at Lab and off-site; holds monthly meetings.	Robert Tallon	4792
Chess Club	Meets weekly in Brookhaven Center.	Kim Mohanty	7110
Choral Group	Rehearses four-part harmony, particularly Nov.-Dec. for annual Christmas concert.	John Weeks	2617
Commodore Users Club	Members share information and techniques on the Commodore computer.	Thomas Dickinson	7196
Concert Committee	Organizes series of chamber music concerts at Berkner Hall.	Donald Lazarus	4643
Cooking Exchange	Meets alternate Wednesdays, Oct.-May, for international cooking demonstrations.	Tina Sferlazzo Noemi Katz	286-9420 3073
Cricket Club	Plays at ball fields, spring through fall.	David Cox	3818
Exercise & Body Building Club	Informal workouts during noontime hour and evenings.	John Rubino	3397
Fly Tyers Club	Fresh-water fans meet weekly year-round.	Kurt Jellett	4698
Golf League	Teams compete weekly; holds tournaments at local courses; May-Aug.	Ronald Webster	2845
Ham Radio Club	Uses club's transmitting equipment in Recreation Bldg., meets year-round.	George Walzcyk	4243
Handball Club	Plays at noontime on site.	Gerald Bennett	7590
Hispanic-American Club	Presents cultural and social Hispanic programs.	Jose Medina	7636
Microcomputer Club	Meets weekly to discuss microcomputer technology.	James Hainfield	3372
Motorcycle Club	Plans frequent outings; meets monthly.	Erno Ostheimer	2697
Mountain & Canoe Club	Plans year-round trips; meets as necessary.	Patrick Thompson	7635
Nursery School Committee	Operates classes for 3- and 4-year-old children of Lab employees, Sep.-Jun.	Dorothy Alessi	924-5984
Performing Dance Committee	Organizes dance programs featuring renowned artists.	Gail Williams	3338
Quilting Club	Meets twice a month for learning and working.	Bernadette Benz	928-1068
Racquetball Club	Uses Royal and Unique Racquetball courts located off-site.	Richard Horwitz	4134
R/C Model Aircraft Club	Flies radio-controlled model planes during scheduled weekends, Apr.-Oct.	Ken Morton	7772
Rifle & Pistol Club	Holds shoots year-round at BNL range and elsewhere; meets monthly.	Otto Jacobi	4406
Runners Club	Schedules meets spring and fall; holds planning meetings as necessary.	William Medeiros	2665
Soccer League	Plays Mondays, 5:30 p.m. at ball fields; plays in gym during winter.	Enrique Abola	4383
Social Club	Holds meetings, parties and arranges short, group trips.	Doris Terry	7610
Softball League	Leagues play from May-Aug. on ball fields.	George Greene	2296
Special Events Committee	Organizes events, including picnics, dinner-theaters and contemporary entertainment.	Rosalie Piccione	3160
Swim Club	Meets Sep.-Jun. after work every Th. at pool for coaching and practice; competes on weekends in metro-area Masters meets.	Marsha Belford	5053
Table Tennis Club	Plays at noontime in Recreation Bldg.	Upendra Rohatgi	2475
Tennis Committee	Sets rules for court use; organizes tournaments.	Gail Williams	3338
Theater Group	Meets year-round for readings and presentations of plays and shows.	Kurt Fuchel	4116
Touch Football League	Plays on ball fields, Sep.-Oct.	Edwin Taylor	7589
Volleyball League	Plays in gym, twice weekly, Nov.-Mar.	Kathi Barkigia	4509

Softball

The Softball Board has scheduled two meetings with Team Captains of both new and existing teams, as follows:

- **Employee's League** team captains will meet with the Board on Wednesday, April 1, at noon, in Room D, Berkner Hall.
- **Mixed League** team captains will meet with the Board on Thursday, April 2, at noon, in Room D, Berkner Hall.

Any team captain who cannot attend a meeting should send someone to represent the team's interests.

Individuals who would like to play softball, but who are not already on a team, should contact Sharon Smith, Ext. 3995.

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Basketball

First Game

Longshots	71	Runaways	63
L. James	15	R. Moran	21
W. Cummings	13	J. Desmond	12
J. Cyr	10	T. James	12
L. Walcott	10	G. Shepherd	12
R. Seymore	8	M. Anerella	6
J. Garrison	7		
F. Molone	4		
R. Rowley	2		
S. Springston	2		

Second Game

Hollywood	48	Celtics	37
E. Meier Jr.	19	J. Gaeta	12
R. Domenech	10	T. Mendez	12
D. Nordstrum	8	M. Fulkersen	11
G. Mack	7	P. Browne	2
G. Smith	4	P. Ratzke	0

Adult Swim Lessons

A course of swimming lessons, open to all employees working on site and their adult dependents, will be given at the pool starting Tuesday, April 7, at 5:15 p.m. The course will consist of one lesson each week on eight consecutive Tuesdays.

Registrations are now being accepted at the pool during open hours. A fee of $20 (checks payable to BERA) will be due at the time of registration.

If a minimum enrollment of twelve is not met before Friday, April 3, the course will be cancelled.

Mountain Club

The Mountain Club will meet in the lobby of Berkner Hall at noon on Wednesday, April 1, to discuss plans for canoeing on the Peconic on April 4, the Housatonic on May 2, and the Delaware on June 13-14. Also, there's the 5-Boro Bike Tour of New York City on April 26. For more information, call Don David, Ext. 4821, or Al Kuehner, Ext. 4226.

BERA Board Seats Go to Frei and Smith

Congratulations to Skelly Frei and Sharon Smith who were elected to the 1987 BERA Board in elections held earlier this month. On May 1, they will replace outgoing members John Connelly and Ed Taylor, and join incumbents Lois Marascia, Rosalie Piccione, Richard Scheidet and Doris Terry.

The Board would like to thank all those who contributed to the success of the election, including the nominating committee, the other candidates, Jean Ramirez and Ed Sperry IV, and, of course, all the voters.

Members of the Brookhaven Employees Recreation Association Executive Board are elected by you to act as your representatives. You are encouraged to discuss with them suggestions or complaints you may have relating to recreation activities.

Golf

The first tournament of the BNL golf season will be held on Thursday, April 9, at the Bellport Country Club. Tee times will begin at 10:30 a.m. and may be obtained by contacting Doug Sweely, Ext. 4237, Bldg. 535B.

There will be an entry fee of $1 for everyone. Deadline for signing up for the tournament is Friday, April 3. The competition will be run as a "kicker's" tournament.

Reminder: The organizational meeting of the BERA Golf Association is scheduled for Friday, April 3, at 5:15 p.m., in the lounge of the Recreation Bldg.

Bowling

Red/Green League

High games were bowled by R. D'Alsace 216, A. Pinelli 213, G. Meinken 210, W. Kristiansen 207, L. Jacobson 200.

Purple League

Frank Gaetan rolled a 204, Marge Stoeckel 198/190, Annamarie Spira 198, Lee Barberich 194, Mary Addessi 193/183, Betty Jellett 186, Jeannette Thiede 183, Alice Alberico 180/178, Fern Coyle 178.

White League

Ken Asselta had a 201, Al Pinelli 200, Sharon Smith 200, Maria Apelskog 188, Pat Manzella 182/182.

Aerobic Dance

Grab your sneaks and grab your mat,
Leave your worries on the doorstep.
Just direct your feet,
And exercise to the beat...

If the spring air makes you feel like dancing, why not give in to that impulse and sign up for the next ten-week sessions of aerobic dance and/or stretch classes?

Which type of class is for you? If you're intersted in a choreographed program of exercises that concentrate on stretching and strengthening various muscle groups, sign up for stretch classes. To emphasize cardiovascular improvement through vigorous, choreographed exercise, you'll want to take aerobic dance.

Classes in aerobic dance are held on Tuesdays and Thursdays, and stretch classes are held on Mondays. All classes run from 5:15 to 6:15 p.m. Participants may take any or all of these classes. Those signing up for aerobic dance are encouraged to take it both afternoons, or one class of aerobics and one of stretch. A mat is suggested for floor exercises in both kinds of classes.

The fee for each ten-week session (M, T or Th) is $30, payable at registration, which will precede the first classes. These classes will be held on the third floor of the Collider Center, Bldg. 1005S, as follows:

- Aerobic Dance — Tuesday, March 31, and Thursday, April 2.
- Stretch — Monday, March 30.

For more information, call Paula Bennett, Ext. 3293, or Bill Leonhardt, Ext. 2378.

Cafeteria Menu

Week of March 30

Monday, March 30

Chicken noodle soup	(cup)	.75
	(bowl)	.95
Fettucine Alfredo w/1 veg.		2.65
Chicken chimichangas w/1 veg.		2.65
Hot vegetable plate (lite-weight)		2.20
Hot deli: Sloppy Joe		2.45

Tuesday, March 31

Southern beef soup	(cup)	.75
	(bowl)	.95
Swiss steak jardinière w/1 veg.		2.65
New England boiled dinner		2.65
Hot deli: Baked ham	(bread)	2.45
	(roll)	2.55
	(hero)	2.65

Wednesday, April 1

Cream of tomato soup	(cup)	.75
	(bowl)	.95
Braised liver & onions w/1 veg. (lite-weight)		2.65
Baked fresh ham w/1 veg.		2.65
Hot deli: Smoked turkey	(bread)	2.45
	(roll)	2.55
	(hero)	2.65

Thursday, April 2

Beef barley soup	(cup)	.75
	(bowl)	.95
Arroz con pollo w/1 veg.		2.75
Meat loaf w/mushroom gravy & 1 veg.		2.65
Hot deli: Six-foot hero		1.10 per inch

Friday, April 3

Boston clam chowder	(cup)	.75
	(bowl)	.95
Seafood Newburg w/1 veg		2.85
English-cut prime rib of beef w/1 veg.		3.25
Hot deli: Pastrami	(bread)	2.45
	(roll)	2.55
	(hero)	2.65

Arrivals & Departures

Arrivals

Thomas J. Haynes ..... Plant Eng.
Costas G. Magoulas ..... AGS
Somkid Nimnual ..... DNE
John S. Ochab ..... Physics
Karen M. Schweikart ..... Biology

Departures

This list includes all employees who have terminated from the Laboratory, including retirees:

Leonard R. Depuis ..... DAS

Service Awards

The following employees received service awards during the month of March:

Forty Years

Arnold S. Benson ..... Plant Eng.
Charles Gargliardo ..... Staff Serv.
Richard N. Hill ..... DCP
Frederick Strier ..... S&EP

Thirty Years

Carl Cantera ..... Physics
Joseph Cardamone ..... Medical

Twenty-five Years

Raymond J. Archbold ..... S&EP
James Cardinal ..... Plant Eng.
Jack J. Fontana ..... App. Science
Norman R. Franklin ..... Accel. Dev.
Carl L. Jacobs ..... Physics
John J. Mazzeo ..... Accel. Dev.
Frank C. Merkert Jr. ..... Physics
Alfred D. Roebuck ..... Physics
Andrew C. Ruzicka ..... Biology

Twenty Years

Carmen M. Benkovitz .... App. Science
John W. McCaffrey ..... Central Shops
Maureen H. Sacker ... Occup. Medicine
Sharon Spark ..... App. Math
Catherine M. Tierney .... App. Science
Claudia R. Tyler ..... Medical

Ten Years

Michael F. Cardarelli ..... Plant Eng.
Richard P. Kuczmarski .... Plant Eng.
Robert P. Miltenberger ..... S&EP
Kathleen A. Tuohy ..... Physics
Eugene F. von Achen ..... Instrum.
Robert W. Youngblood ... Nuc. Energy

Classified Advertisements

Placement Notices

The Laboratory's placement policy is to select the best-qualified candidate for an available position, with consideration given to candidates in the following order of priority: (1) present employees within the department and/or appropriate bargaining unit, with preference to those within the immediate work group; (2) present employees within the Laboratory as a whole; and (3) outside applicants. In keeping with the Affirmative Action plan, selection decisions are made without regard to age, race, color, religion, national origin, sex, handicap or veteran status.

Each week, the Personnel Office lists new personnel placement requisitions. The purpose of these listings is, first, to provide open placement information on all non-scientific staff positions; second, to give employees an opportunity to request consideration for themselves through Personnel; and, finally, for general recruiting purposes. Because of the priority preference policy stated above, each listing does not necessarily represent an opportunity for all candidates. As a guide to readers, the listings are grouped according to the anticipated area of recruitment.

Except when operational needs require otherwise, positions will remain open for one week following publication date.

For further information regarding a placement listing, contact the Employment Manager, Ext. 2882.

LABORATORY RECRUITMENT - Opportunities for Laboratory employees only.

2577. CLERICAL POSITION - Requires two to three years' experience in an office, good typing and good communications skills. Will assist Department administrative group performing diverse duties specific to that group. Prior experience with computer terminal usage is desirable. Physics Department.

2578. LAUNDRY OPERATOR B - Plant Engineering Division.

2579. TOOL AND INSTRUMENT MAKER, GROUP LEADER (Heavy Machine Shop) - Central Shops Division.

OPEN RECRUITMENT - Opportunities for Laboratory employees and outside applicants.

2580. COMPUTER OPERATIONS POSITION - Requires AAS degree in data processing or successful completion of computer operations training program or equivalent experience. Will assist in the operation of a Hewlett-Packard 3000 computer. Must be willing to work shifts. Management Information Systems Divison.

Autos & Auto Supplies

77 PLYMOUTH VOLARE - 6 cyl., 2 dr., stand. trans., am/fm, body fine, engine runs very well. 924-6751.

TIRES - (2) H-78-15LT 'D' range, Goodyear, $15 ea. Ext. 4597 or 924-8213 after 5 p.m.

82 AUDI - coupe, 5 cyl, 5 spd., red/black, 47k mi., $8,000 neg. Jim, 878-8591, eves.

84 VIKING CAMPER - 8' slide-on, 2-way refrig., sink, mint, extras. 821-9659 after 12.

80 VOLVO DL - station wagon, low mi., garage-kept, excel., $4,500. Ext. 7111 or 751-7268, eves.

77 VIKING POP-UP - elect. refrig., sink, 120-12 V twin gas tanks, $1,000. Dan, Ext. 4987 or 698-7322.

69 CUSTOM CORVETTE - 350/350, 4 spd., T-tops, new red paint, $9,000 or trade. 585-8171.

82 HONDA ACCORD - 5 spd., htchbk, $3,500. George, Ext. 4144 or 472-1518, eves.

78 FORD PINTO - runs well, $500. Ext. 3102.

78 COUGAR XR-7 - 351, excel. cond., blue, am/fm cass., a/c, new tires, $1,500. Bert, Ext. 2050.

77 PLYMOUTH FURY - station wagon, new tires, radiator, and other parts, $225. Ext. 4630 or 751-2117.

78 MALIBU - station wagon, 104K mi., runs, $700. Ext. 2627.

CAMPER/TRAILER - 1970, Tagalong, 14', many extras, fully self-contained, excel. cond., $2,000. Pete, 399-2813.

DODGE ASPEN - station wagon, V8, a/t, 120k mi., $450. Ext. 4521.

86 GMC PICKUP - loaded, 13k mi., high-rise cap, running boards, must sell, $12,500. Bert, Ext. 2050 or 273-4359.

78 CHEVY NOVA - right front damage, good for repair or parts, best offer. 722-4821.

72 PLYMOUTH - full-size station wagon, excel. running cond., Ext. 2022 or 744-8386.

84 OLDSMOBILE - Cutlass Supreme Brougham, 2 dr., 35k mi., mint, loaded, asking $7,000. 475-5696.

80 VOLVO DL - stand. trans., 2 dr., tan, very good cond., $4,200. 929-6442 after 6 p.m.

71 FORD F350 - pickup, 1980 box-high cap, trlr. hitch, wiring, extras duals, very good cond., orig. owner, $2,800 or $2,500 without cap. 878-6637.

82 PLYMOUTH CHAMP - 48k mi., new tires, battery, brakes, excel. in & out, $2,500. 363-7032.

80 HONDA PRELUDE - 5 spd., elec. sunroof, Blaupunkt stereo, good cond., 325-0447 after 6 p.m.

77 DODGE ASPEN - station wagon, very depend., $1,400. David, Ext. 3406 or 744-7131, eves.

81 GRAND PRIX - a/t, V6, 55k mi., maroon, new tires, clean, excel. cond., $3,500 firm. 732-6569.

76 PONTIAC CATALINA - 400 eng., excel. running cond., $175; 68 Road Runner, body only, $700. 924-0960, eves.

79 CHEVY PICKUP - 6½' bed, 3 spd., 10x15lt front, 11x15lt rear, white spoke rims, stereo, fog lights, sunroof, $2,100. Ray, Ext. 3536 or 289-7615.

75 CAMARO - 6 cyl., rebuilt eng., stereo, wire wheels, tires w/raised lettering, excel. $2,200. Ext. 2529.

70 DODGE DART - Swinger, new battery, brakes, tires, 318 eng., runs very well, good transp., $750. Ext. 2075 or 473-4937.

81 PLYMOUTH CHAMP - 62k mi., troubled a/t, rest good, new tires, exhaust, orig. owner, $1,300. Ext. 2344 or 751-4254.

79 DODGE COLT - running cond., $300 or best offer. Alan, Ext. 4714 or 744-5093.

76 CUTLASS SUPREME - new parts, runs well, clean, $1,600. 298-8227 after 5 p.m.

80 RABBIT - diesel, for parts. Ext. 4008.

78 DATSUN 280Z - 5 spd., a/c, blue, good cond. Dave, Ext. 4088 or 298-9571 after 5 p.m.

81 CORVETTE - a/c, p/l, p/w, p/s, cruise, beige, T-tops, tilt/tele, must sell, asking $11,500. 744-3968.

67 CHRYSLER CONVERTIBLE - 383 V8, a/t, p/s, p/b, p/w, new top. Tony, 698-9274.

72 CHEVY KINGSWOOD - station wagon, p/s, p/b, a/c, a/t, 350, excel. transp., $1,000 or best offer. Ext. 4986 or 727-0364.

79 MUSTANG II - 4 spd., 80k mi., good tires & body, new exhaust, asking $900; 81 Suzuki GS250T, low mi., excel. cond., $690. 929-8287.

QUARTER PANEL - new, left rear, rear panel holds tail lamps assembly. Ext. 4204.

80 CHEVETTE - a/c, 4 spd., 4 new all-season radials, good cond., $1,250. Bob, 331-5912, eves.

71 CHEVY MALIBU - 2 dr., 307 eng., a/t, p/s, orig. owner, $550. Gordon, Ext. 3216.

SEAT COVERS - Mercedes, full set, new, front buckets, rear bench, red Scotch plaid; front and rear mats, $50. Ext. 4204.

77 CAMARO - V8, a/t, black; 73 Capri, stand., decor group, many new parts, must sell. 744-0725.

79 FIAT X19 - 5 spd., black, hardtop convert., new Blaupunkt stereo, new exhaust. 981-0838.

78 BUICK LeSABRE - 50k mi., excel. mechanical cond., 8 cyl, good body. 751-7408 after 4 p.m.

75 FORD LTD - 8 cyl., 2 dr., excel. cond. Ext. 2265 or 289-0567.

FULL LINER - for light truck. Pete, 475-0831.

WIRE WHEEL COVERS - set of four, 15" tires, like new, 325-0447 after 6 p.m.

Boats & Marine Supplies

14' AMF SUPER SAILFISH - good cond., w/Shoreline trailer, $750. 265-1308 after 7 p.m.

16' HOBIE CAT - 1976, good cond. w/recond. trailer, ready to go, $1,500. 821-9659.

23' SEAFARER SAILBOAT - ½ share, sleeps 3, moored in E. Setauket, $3,000. Paul, Ext. 2961 or 751-5593, eves.

20' GLASTRON - full canvas, less motor, teleflex steering, at Mattituck, $990. Jim Klein, 298-8805.

19½' SEA SPRITE - cuddy, 1985, 120 h.p., i/o, electronics, trailer, C.G. package, full canvas, $10,000. 363-6845.

CHAIN - ⅜" galvanized, coil, $2/foot, 50' minimum. 399-1679.

28' OWENS - 1965, wood hull, sound, f.g. flying bridge, V8 not running, new cushions, asking $700. Ext. 3536 or 289-7615.

24' CHRIS CRAFT - plywood and mahogany, $500 or best offer. 744-2715 after 6 p.m.

19' LIGHTNING - sailboat, f.g., race equipped, excel. cond., $2,500. 399-1679.

18' RENKEN - 1983, i/o, 120 h.p. OMC, w/trailer and full cover, excel. cond., $5,900. Ady, Ext. 4531 or 331-3785.

Miscellaneous

ANNUALS - $10 per flat; impatiens, petunias, geraniums, more, $2 ea.; hanging fuschia, $10; azaleas, 2'-3', balled & burlaped, $5 ea. 744-0722.

TICKETS - (2) Alvin Ailey dance group, SUNY Stony Brook, April 25, $30/pr. Peter, Ext. 4094.

JET PUMP - deep well, ¾ h.p.; glass-lined tank, $75. 924-6751.

FISH TANK EQUIPMENT - pump, filter, etc. Ext. 3181.

CARD TABLE - felt top, seats 8, recessed for chips, $40. Tony, Ext. 2050.

HAMS - XCUR, Drakw Twins R4B, T4XB, AC4, PS and spkr., extra XTALS. Paul, Ext. 2343.

STEREO SPEAKERS - (2) Untraliner 260, 75 watts, $80; stereo cabinet, $20. Brehm, 744-3767 after 6 p.m.

RECLINER - excel. cond., $100. Ext. 2895 or 289-5420 after 4 p.m.

PATIO DOOR - 8', double glass, $200; alum. sliders, various sizes, 6'x5', 4'x5', more w/storms, screens, best offer. Al, Ext. 3992 or 331-1003, eves.

CRIB - w/mattress, excel. cond., $40. 475-7454 after 6 p.m.

SONY STEREO SYSTEM - HP250, am/fm, w/external spkrs., new needle, $70. Tony, Ext. 2050.

SOLAR NAILS - $25 set, $15 for refills. Patti, 399-6373.

FABERWARE PERCOLATER - 2-4 cups, $15; 8 pc. Flint utensil set w/rack, $15; 6 pc. Flint knife set w/rack, $15. 744-6292.

DINING ROOM SET - trestle table, 40"x72", 2 leaves, 2 sidechairs, 2 arm chairs. $250. Otto, 472-0339.

CAMERA - Honeywell Pentax 35mm, lenses, extras; cradle, wood, hand-made, exquisite, future heirloom. Ext. 3123 or 821-1039.

LIONEL TRAIN SET - extra track, switches, buildings, etc. Bob, Ext. 4428 or 467-4222.

BICYCLE - child's, 16", Schwinn w/training wheels, $25. Ext. 5400 or 874-3447.

SURVEYOR'S LEVELING ROD - metal face, 2 section, 'Philadelphia,' this week $25, next week $20. John, Ext. 7671.

MOTOR - Briggs and Straton, 2 h.p., horizontal shafts w/cent. clutch, good cond., for go-kart, $50. Dan, Ext. 4987 or 698-7322.

RADIO - cass.-recorder, Magnavox, 8 months old, $35. Ext. 3102.

MICROWAVE OVEN - large. 475-9452 after 5:30 p.m.

LUGGAGE - beautiful, 5 pc., Jordache, brown/beige tweed, on wheels, used once, $93. Phyllis, Ext. 3389.

KITCHEN CABINETS - wood, almond formica counter tops, modern, almost new, reasonable. Ext. 5277.

9" T.V. - J.C. Penny, b/w, solid state, good cond., $25. Ext. 2733.

TICKETS - Jay Leno, Westbury Music Fair, June 28, good seats, must sell. Nancy, Ext. 3309.

DWYER UNIT - 2 burner stove, small sink, refrig., great for studio apt., $300. 472-0706, eves.

BICYCLE - man's, Ross w/Shimano components, 12 spd., 21" frame, 27" wheels, extras, used 2 months, Ext. 2022 or 744-8386.

WASHING MACHINE - Sears, new motor, good cond., reasonable. 363-7032.

BATH TUB - free-standing, ball & claw, good cond., $100; Kenmore washer/dryer combo, $150. Sheldon, Ext. 2043.

RECLINER - brown vinyl, $90; meat grinder, Rival, $20; kerosene heater, Sun-air Glow, 22,800 Btu, $90, all excel. Ext. 2683 or 751-2469, eves./wknds.

ROWING MACHINE - DP300, $75; carafe, silver-plated, 20 cup w/warmer. Paula, 654-1185, eves.

REFRIGERATOR - freezer, Frigidaire, 21 cu., antique gold, frost-free, $195. Ext. 3164.

COLOR TV - 19", Motorola, needs sound control, $20. 399-0537.

35mm CAMERA - Canon AE-1 w/case, F1.4 lens, Canon dedicated flash, filters, instruction book, immaculate, asking $175. 473-8387.

VIOLIN - Guarnerius copy, $200; electric bass, $100. Jeff, 654-1185, eves.

SUMP PUMP - brand-new, Kenco, immersible, ⅓ horse power, 1,725 rpm, continuous duty, 115 volts, $80. Ext. 2529.

ENGAGEMENT RING - ½ carat, $900. Frank, Ext. 2377 or 325-9584 after 6 p.m.

GENERATOR - 5 kV, Briggs and Stratton eng., Mfg. Agtronic. J. Medina, Ext. 7636 or 654-3472.

CRIB MATTRESS - dresser, yellow, Simmons, good cond., $125. 567-9025 after 6 p.m.

FURNITURE - living room set, $550; bdrm set, queen, $350; Om, Ext. 5332 or 928-2994.

BICYCLE - 10 spd., gently used, and very seldom, $130 new, will sell for $75. Bill, Ext. 2378 or 758-3284.

SOLID PINE TABLE - 7'x3'; cherry wood china cabinet, Bassett furniture, $250. 924-0960, eves.

SOFA - traditional, aqua, blue and white, velvet, $100; fireplace tools, $10. 744-0722.

SUBMERSIBLE PUMP - new, Gould, wire and controls, call for price and description. Ext. 4204.

LAWN MOWER - 22", rotary, rear bagger, 3½ h.p., Briggs and Stratton, new; 5' diam. azaleas, U-dig.; Franklin stove. 689-9234.

COLOR TV - $75; bath scale, white, $5; kerosene stove w/can, $35; white corner china cabinet, $60. 924-2726.

TOP SOIL - screened, $12 per yard delivered. 924-7746.

OFFSET PRINTING PRESS - Davidson 500, wood type and racks. 261-1153.

HEADBOARDS - (2) maple, twin size, $15. Tony, Ext. 2050.

STEEL CAGE - new, ideal for transporting or house-training medium-size dog, $30. Peter, Ext. 4094.

LIVING ROOM SET - 4 pc.; portable washer/dryer, other apartment items. 698-6585 or 286-2426.

Car Pools

LIE EXIT 54 - Wicks Rd., driver needed, 4-man car pool, 8:30-5:00. Mike, Ext. 2705.

STONY BROOK - van has opening, for 2 riders. Sid, Ext. 4125 or Paul, Ext. 2476.

ROCKY POINT - seeks new members. Ext. 3123.

OAKDALE - Bohemia, would like to form car pool. Frank, Ext. 2314.

BETHPAGE - driver wanted. Lou, Ext. 4615.

STONY BROOK - M-section, want to join or start a car pool. Jag, Ext. 5080 or 751-1884.

Free

DUTCH BUNNIES - (2), beautiful, w/cages. Sally, 821-1726.

Yard Sale

MIDDLE ISLAND - 3/27 & 3/28, ¼ mi. south of blinking light on Rt. 25, 36 Medford Rd. Rick, Ext. 2434 or 924-6063.

Real Estate

Real Estate advertised for sale or rent is available without regard for the race, color, creed, sex or national origin of the applicant.

For Rent

NORTH SHIRLEY - 3 bdrm. apt., full bath, cable, l/r, eik, appl., 7 min. to Lab, avail. 4/1/87, $750 inc. fuel & elec. 395-1084.

MORICHES - room in shared waterfront house, avail. immed., non-smoker preferred, not essential, $315/mo. + util. 874-3729.

HILTON HEAD, SC - 2 bdrm. cond., sleeps 6, extas, golf, tennis, beach, pool, $300/wk before 4/11, $400/wk after 4/11. 585-9149.

For Sale

E. SETAUKET - 3V school district, mint, move-in cond., 4 bdrm, center hall, Colonial, 2 car., bsmt., custom fp, den, eik, owner, $169,900. 473-6429.

PORT JEFF./SETAUKET - 4 bdrm., 2½ baths, den, garage, deck, dry bsmt., well-insulated, mint cond., on wooded ⅓ acre, $210,000. 928-0281.

PATCHOGUE - cape, 2 bdrm., bdrm./den, l/r, d/r, eik, new bath, 1½ car gar., bsmt., unfinished 2nd floor, porch, many extras, taxes $1,000, ¼ acre, $123,000. Jim, Ext. 4606 or 654-5049.

CENTRAL FLORIDA - mobile home, $1,500 down payment, 1987 model, for information. Carol, 878-0885.

SHOREHAM - 3 bdrm., ranch, l/r, d/r, eik, fam. rm., heavily wooded acre, SWR schools, taxes $1,200. $129,000. Ed, Ext. 7786 or 744-7796.

PORT JEFF. STA. N. - 3 bdrm. ranch, vinyl siding, Andersens, attached garage., large deck, full basement, $139,500. 928-6944.

Wanted

GUITAR CASE - used, reasonable. 722-4821.

LARGE BICYCLE - 25" frame, 10 spd. or more, reasonable price. Ext. 2180 or 286-3937.

SURVEYOR'S LEVEL - in fair cond. Butler, Ext. 3430.

HOUSE TO SHARE - summer season OK, yearly lease preferable, non-smoking, vegetarian, excel. refs. 924-3547.

TRAILER - for small sailboat, 12' LOA. Eric, Ext. 4603.

FLOTATION VESTS - 2 to 4, front-fastened, collarless, adult-sized. John, Ext. 7671.

CHAINSAW - for 28' Owens, 1965, not running, wood hull. Ray, Ext. 3536 or 289-7615.

HOUSE - Bellport area for August rental, longtime Bellport residents (2), now moved upstate, look forward to return visit. (607) 273-5391 or 472-1174.

CHEVY V8 - good running; 480x8" boat trailer tires, cheap. Bill, Ext. 4988 or 698-4882 after 6 p.m.

WEIGHT-LIFTING EQUIPMENT - for young beginner, reasonable. Mike, Ext. 5316 or 473-8762.

GARAGE SPACE - for vintage fully insured auto. 751-0182 or 689-1539.

Classified Ad Policy Deadline is 4:30 p.m. Friday for publication Friday of the next week.